

Remarks

Responsive to the Office Action mailed August 9, 2010, Applicant requests reconsideration and withdrawal of all outstanding rejections for the reasons set forth below.

Rejections Under 35 U.S.C. § 103(a)

The previous grounds of rejection, which were based on Eurlings et al. '907 in view of Lee et al.'968, were overcome by Applicant's Response of June 21, 2010. However, the Examiner performed additional searching and has issued new rejections based in part on newly cited prior art. All pending non-withdrawn claims, namely claims 23-32 and 34-36 have now been rejected under Section 103(a) as allegedly being obvious over Eurlings et al. '907 in view of newly cited U.S. Patent Number 6,425,559 to Oliver et al. No other rejections or objections remain to be addressed.

Oliver et al. '559 arguably discloses at least some form of dynamic decoupling to mitigate adverse effects of vibration in a narrow band Excimer laser. More particularly, Oliver et al.'559 discloses an elaborate support structure for supporting the gas chamber and the associated resonance cavity optics in a manner purported to isolate the chamber optics from vibration caused by the blower associated with the gas chamber. The present rejections continue to rely on Eurlings et al. '907 for its teachings of a feeder device, namely, exchanger (12) or exchangers (12A) or (12B), for selectively exchanging optical elements (10), (10A) or (10B), respectively, into and out of a beam path (22).

Independent claim 23 has been amended in several respects. The term "feeder device" has been replaced with "interchange mechanism" solely for the purpose of conforming to the terminology used in the Specification. Support can be found in the

Specification as originally filed at, for example, the next to last line on page 3 and in line 4 on page 7.

Claim 23 has also been amended to recite that the optical assembly of the apparatus includes a housing and that the plurality of optical elements of the optical assembly include at least one selected optical element and a plurality of remaining optical elements and that the selected optical element is selectable from among a plurality of optical elements available from the interchange mechanism. Support for the recitation of the housing can be found, for example, in the housing (1a) shown in Fig. 1 and the housing (10a) shown Figs. 2a, 3 and 4 and referred to at, for example, the second line of paragraph 0020 and the fourth line of paragraph 0025 and the fifth line of paragraph 0040 of the Specification as published in Pub. No. 2007/0076184 A1 (the "Published Specification"). Support for the optical assembly having a plurality of optical elements can be found, for example, in original claim 20 and the plurality of optical elements (2), (2') and (2'') shown in Fig. 1 and the plurality of mirrors (12) and diaphragm (12') shown Figs. 2a, 3 and 4 and referred to at, for example, paragraphs 0020 and 0025 of the Published Specification. Support for the optical assembly including at least one selected optical element and a plurality of remaining optical elements can be found for example in Figs. 2a and 3 as well as in paragraphs 0027 and 0032. Support for the selected optical element being selectable from among a plurality of optical elements available from the interchange mechanism elements can also be found for example in Figs. 2a and 3 as well as in paragraphs 0027 and 0032 of the Published Specification.

Claim 23 has also been amended to recite “*said selected optical element being inserted into an operating position in the beam path, said operating position being a position at which said selected optical element is separate from said interchange mechanism, said interchange mechanism being supported by a structure which is substantially dynamically decoupled from said housing and from said remaining optical elements arranged along the beam path*”. Support can be found in Fig. 3 and paragraphs 0032 through 0035 of the Published Specification. Applicant respectfully submits that with this amendment, the rejection of claim 23 is overcome.

Eurlings et al. '907 is relied upon by the Examiner for its teachings of a feeder device, namely, exchanger 12, for selectively exchanging optical elements into and out of the beam path. However, in contrast to proposed amended claim 23, there is no express or implied disclosure, teaching or other motivation in either Eurlings et al. or '907, Oliver et al. '559 – or elsewhere in the prior art of record or of an apparatus as presently claimed wherein, in addition to the interchange mechanism being supported by a structure which is substantially dynamically decoupled from the housing of the optical assembly and the remaining optical elements in the beam path, the selected optical element is located for use at an operating position at which the selected optical element is *separate from* the interchange mechanism. Referring to Figs. 2 and 7 of Eurlings et al. '907 it can be appreciated that the exchangers 12, 12A and 12B are clearly depicted as being connected by way of solid lines with their respective optical elements 10, 10A and 10B when the optical elements are positioned for use in the beam path (22). Thus, according to Eurlings et al. '907 those optical elements remain attached to the exchangers 12, 12A and 12B when the optical elements are in their operating position in the beam path.

Supporting this interpretation, Eurlings et al. '907 teaches at col. 9 lines 18-24 that the exchanger 12 may comprise, “a carousel or rotatable disc provided with several optical elements and controllable to position one of those optical elements in the beam path” or a “slide-in-slide-out mechanism as employed in a photographic slide projector, for example” but is devoid of any express or implied teaching or suggestion of any apparatus or mode of operation according to which a selected optical element in its operation position would be *separate from the interchange mechanism* as claim 23 in its present form expressly recites. To the contrary, Fig. 5 of Eurlings 35 al. '907 illustrates an embodiment in which a carousel (32), which is described at col. 12 line 43 as being part of the exchanger (12) of Fig. 1 is clearly shown as being directly attached to, and supporting, optical elements (42) and (44) in their operating positions the path of an incident beam (40). Thus, there is nothing in Eurlings et al. '907, either alone, or in combination with Oliver et al. '559, or any other prior art of record or any other information or knowledge reasonably within the purview of the person of ordinary skill in the art at the time Applicant's invention was made which might reasonably motivate such person of ordinary skill to conceive of an apparatus along the lines of claim 23 in its present form which provides dynamic decoupling by not only by having the interchange mechanism supported by a structure which is substantially dynamically decoupled from the housing and from the remaining optical elements arranged along the beam path as claim 23 expressly recites, but also by the recitations which provide that an operating position for the selected optical element is one in which the selected optical element does not remain attached to interchange mechanism as in Eurlings et al. '907. In contradistinction, according to claim 23 the operating position of the selected optical

element is instead one at which *“said selected optical element is separate from said interchange mechanism”*.

The recited apparatus of present represents a patentably non-obvious improvement over the combination of Eurlings et al. '907 and Oliver et al. '559 postulated by the Examiner since using a support structure as in Oliver et al. '559 to dynamically separate the exchangers 12, 12A and 12B of Eurlings et al. '907 from its optical elements 10, 10A and 10B would only be capable of achieving whatever degree of dynamic separation was possible within the performance limits of the support structure itself whereas in the apparatus of claim 23, more complete dynamic decoupling is made possible. Contrary to the teachings of Eurlings et al. '907, the operating position of the selected optical element according to the invention of claim 23 is one at which *“said selected optical element is separate from said interchange mechanism”*. Due to this separation, the vibration transmission path corresponding to the solid lines shown connecting the exchangers (12) and with the optical elements (10) located in their operating position in beam path (22) in Figs. 2 and 7 of Eurlings et al. is not present in the apparatus of claim 23 thereby affording more complete dynamic decoupling than could be achieved by merely using a dynamic decoupling support structure like that of Oliver et al. '559 as postulated by the Examiner. Accordingly, the rejection of claim 23 is now moot, and should be withdrawn.

Claim 25 has been canceled without prejudice.

Claims 24, 26-32 34 and 35 each depend directly or indirectly from claim 23 and claim 36 incorporates all the limitations of claim 23. All of those claims are therefore patentable over the art of record for at least the same reasons as noted above concerning

claim 23. Accordingly the Examiner's rejections of those claims have been overcome or rendered moot for at least those same reasons. However a number of those claims are also submitted to also be separately patentable on independent grounds for reasons which will now be discussed.

Claim 24 has been amended to recite that the interchange mechanism is located outside the housing of the optical assembly. Applicant respectfully submits that, contrary to the Examiner's assertion, Eurlings et al. '907 does not disclose an apparatus having an optical assembly with a housing which includes an opening adapted to the dimensions of a plurality of selectable optical elements available from an interchange mechanism such that a selected optical element can be both inserted and removed from the beam path of the optical assembly by way of the opening.

Fig. 1 of Eurlings et al. '907 discloses that the illuminator IL includes a housing indicated by a rectangular box which encloses all the other parts of illuminator IL. Fig. 2 is described at col. 7 lines 39 and 40 as illustrating a part of the illuminator. Since the housing is not indicated in Fig. 2, and since there is no teaching whatsoever that exchanger (12) or any of the other items depicted in Fig. 2 are located outside the housing, the clear inference is that all the items shown in Fig. 2, including without limitation the exchanger (12), are located inside the housing of the illuminator IL of Fig. 1. Thus, the exchanger (12) of Eurlings et al. '907 is not located outside the housing as claim 24 recites and the optical element (10) coupled to the exchanger (12) would therefore not be inserted and removed from beam path (22) by way of an opening in the housing as claim 24 also expressly recites. Indeed, Eurlings et al. '907 discloses no

opening in the housing of illuminator IL which adapted for insertion or removal of the optical elements (10), (10A) and/or (10B).

As a consequence of the exchanger (12) of Eurlings et al. '907 being located inside the housing of illuminator IL, contaminants produced by exchanger (12), such as particles produced as a result of wear and/or off-gassing of components, can be liberated inside the housing of illuminator IL of Eurlings et al. '907 and thus pose a risk of contaminating the optical elements located inside the housing. Eurlings et al. '907 does not even appear to recognize such contamination risk, much less provide any teaching or suggestion that would for any reason motivate a person of ordinary skill in the art at the time Applicant's invention was made to address the problem by locating an interchange mechanism of an apparatus as claimed in claim 23 outside the housing of the optical assembly and to insert and remove selected optical elements by way of an opening in the housing as claim 24 recites. Those deficiencies of Eurlings et al. '907 are not cured by Oliver et al. '557 or any of the other prior art of record. Accordingly, claim 24 is not only patentable over the prior art of record but is patentable for reasons independent of those supporting the patentability of claim 23.

Notwithstanding its dependent form, Claim 32 is also respectfully submitted to be patentable independently of claim 23 for reasons similar to those pointed out regarding claim 24. Claim 32 recites that at least one of the interchange mechanism and the lifting device are located outside the housing of the optical assembly. The Examiner contends that the recitations of both a "lifting device" and a "feeder device" (the latter term amended now to "interchange mechanism") are met by the exchanger (12) of Eurlings et al. '907. It has already been pointed out that Eurlings et al. '907 teaches that the

exchanger (12) is located inside the housing of the illuminator IL. Since the Examiner equates exchanger (12) with “lifting device” in Eurlings et al. '907, it too must, of logical necessity, be located inside the housing of the illuminator IL shown in Fig. 1 of Eurlings et al. '907 (if indeed a “lifting device” within the meaning of that recited term as properly construed may be found anywhere in Eurlings et al. '907, which Applicant does not admit). By locating one or both of the interchange mechanism and the lifting device outside the housing the risk of contaminating optical elements inside the housing due to particulates resulting from wear or off-gassing is reduced by the apparatus of claim 32. For the reasons pointed out above concerning claim 24, neither Eurlings et al. '907 nor any other prior art of record can reasonably be viewed as providing any express or implied motivation which would have lead a person of ordinary skill in the art at the time Applicant's invention was made to locate the recited interchange mechanism outside the housing of the optical assembly. Given that the Examiner equates the exchanger (12) of Eurlings et al. '907 with the recited “lifting device” as well as with the recited “interchange mechanism”, the prior art of record also cannot reasonably be considered to have motivated such person of ordinary skill to locate the lifting device outside the housing of the optical assembly. Accordingly claim 32 is also patentable independently of claim 23 as well as of claim 26.

Claim 26 has been amended to recite that the interchange mechanism further comprises a lifting device *for lifting said at least one selected optical element*. Support can be found for example in paragraph 0027 of Published Specification the 0037 of the Published Specification and Fig. 3 which shows an interchange mechanism in the form of a diaphragm device (17) which includes a lifting device (20) and shows a selected

optical element (12') being lifted by the lifting device to an operating position (15). Applicant respectfully submits that the Examiner's contention that the exchanger (12) of Eurlings et al. '907 can be characterized as a "lifting device" is, at best, not supported by Eurlings et al. '907, itself.

The ordinary meaning of "lift" according to the Merriam Webster Online Dictionary is "to raise from a lower to a higher position". (see <http://www.merriam-webster.com/dictionary/lifting?show=2&t=1294587122>). Nowhere in the passage cited by the Examiner, or elsewhere in Eurlings et al. '907, is there any indication that exchanger (12) raises optical element (10) from a lower position to a higher one. As Fig. 1 of Eurlings et al. '907 shows the illumination beam passes through the illuminator IL of Eurlings et al. '907 generally in the downward (-z) direction as indicated by the coordinate system marked on Fig. 1. Thus the beam 22 shown in Figs. 2 and 7 of Eurlings et al. '907 travels not horizontally, but also in the vertical (-z) direction. It can be appreciated therefore that if exchanger (12) is constructed as any one of the specific alternative mentioned in Eurlings et al. '907, i.e. "a carousel or rotatable disc provided with several optical elements and controllable to position one of those optical elements in the beam path" or a "slide-in-slide-out mechanism as employed in a photographic slide projector, for example" (quoting from Eurlings et al. '907 at col. 9 lines 18-24) there would be no need to lift any optical element (10) (10A) or (10B), to insert and remove same into and out of the path of beam (22). Rather, with such structures, exchanging of optical elements (10) would be carried out by simple rotation in a horizontal plane parallel to the x-y plane (i.e. rotation about an axis parallel to the vertical z direction) or by sliding in a direction along such a plane. Indeed, at col. 12 lines 42 -45, Eurlings et

al. '907 teaches that the "carrousel (part of exchanger 12 in Fig. 1) is rotatable around the axis 31 and laterally movable in mutually orthogonal directions x and y, substantially perpendicular to axis 31". As can be seen from Fig. 5, axis 31 is oriented substantially parallel to the beam path, so the lateral movement would also not constitute lifting. Accordingly, claim 26 is respectfully submitted to be patentable even independently of claim 23 as well as for the reasons noted above as to claim 23.

Applicant points out that at col. 11 lines 12- 33, Eurlings et al. '907 does refer to an alternative embodiment in which "the optical element 10 *and the lens 14* are both movable along the optical axis 22 of the illuminator". (emphasis added) However, consistent with Fig. 2, nowhere in Eurlings et al. '907 is the lens (14) shown or described as being connected to, or manipulable by, exchanger (12). Since col. 11 line 14-18 indicates that in order to change the radial extent of the intensity distribution in the pupil plane the movement of optical element (10) and lens (14) must be a "simultaneous movement", Applicant submits that it would be engaging in improper hindsight to construe Eurlings et al. '907 as teaching that the exchanger (12) of Eurlings et al. '907 carries out this particular movement of optical element (10) and lens (14).

Claim 27 depends directly from claim 26 and indirectly from claim 23 and is therefore submitted to be submitted to be patentable for at least the reasons noted above regarding claim 26 as well as those noted as to claim 23.

Claims 35 and 36 have been amended so that they no longer even arguably merely recite an intended manner of use as contended by the Examiner. Both claims 35 and 36 incorporate the limitations of claim 23 and are therefore patentable over the prior art of record for at least the reasons noted above concerning claim 23.

Miscellaneous Claim Amendments

A number of amendments have been made for reasons which are unrelated to patentability and were not necessary in order to patentably distinguish over the prior art of record. Among them are the following:

Claim 24 has been amended to avoid a redundant recitation that the optical assembly includes a housing since such is now recited in amended claim 23 and the claim has been amended to clarify that insertion as well as removal of the selected optical element take place by way of the opening and to conform its terminology with that of claim 23.

Claim 26 has been amended to depend from claim 23 rather than from canceled claim 25 and has also been amended to conform to the amendments made to claim 23. Such conforming amendments have also been made to claims 30, 31, 32 and 34.

Claim 29 has been amended to remove an extraneous reference to purpose.

Claim 32 has been amended for improved definiteness by removing the term "and/or". Also, the word "located" has also been substituted for "arranged" for improved definiteness. The term "feeder device" has been replaced with "interchange mechanism" for conforming to the terminology used in the Specification and claim 23 as amended.

Claim 34 has been amended for proper grammar by removing the word "is". Also, the words "diaphragm, in particular" have been removed because they were unnecessary.

Withdrawn claims 20, 21 and 22 have been amended for improved clarity including to amend the preambles of those claims into a format conforming to conventional U.S. patent practice.

Withdrawn claim 33 has been amended to depend from withdrawn claim 21.

Amendment of the Title

The title of the invention has been amended from 'Optical Assembly for Photolithography' to "Optical Apparatus for Photolithography" to better conform to the preambles of the claims in their present form which recite an "apparatus" rather than an "assembly".

Amendment of the Specification

"What is claimed is:" has been added to the last line of the Specification.

Amendment of the Abstract

The Abstract has been amended by way of a Replacement Abstract which is intended to better reflect the gist and nature of the technical disclosure. No New Matter has been introduced by way of the Replacement Abstract.

Amendment to the Drawings

Fig. 3 has been amended to correct the item number indicating the plug-in units from numeral 20 to numeral 21 thereby conforming Fig. 3 to the written description set forth in paragraph 0034 of the Published Specification which provides support for this amendment. Accordingly, no New Matter has been introduced by way of this amendment to the Drawings.

No new Figs. of Drawings have been added and no Figs. of Drawings have been deleted by this amendment.

Conclusion

In view of the foregoing, it is believed that all outstanding rejections of record have been overcome or rendered moot and that claims 23, 24, 26 through 32, inclusive, and 34 through 36, inclusive are in condition for allowance in their present form. A prompt Notice of Allowance is therefore respectfully solicited.

Respectfully submitted,

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